

CLAIMS:

- [Sub A1
1. A method for detecting invalid electronic storage media each storing therein identification information recognized as an invalid electronic storage medium, said method comprising the steps of:
- registering the individual identification information on said invalid electronic storage media as a list, said individual identification information being grouped into a plurality of groups;
 - assigning the individual identification information and group value information to each of said electronic storage media;
 - reading said individual identification information and said group value information in response to a usage request for said electronic storage medium;
 - checking one of said plurality of groups if the individual identification information on the electronic storage medium is registered therewith, said one of plurality of groups corresponding to said group value information that was read; and
 - judging that the requested electronic storage medium is invalid if the individual identification information corresponding thereto is found and judging that the requested electronic storage medium is valid if the individual identification information corresponding thereto is not found.
2. The method for detecting invalid electronic storage media according to claim 1, further comprising

the steps of:

checking the list if there is a bias in the groups grouped by said group value; and

if said electronic storage media are concentrated in one specific group, not assigning the group value information on said specific group to the group value information on the newly-issued electronic storage medium.

3. A card system comprising:
- a plurality of cards each having unique identification information;
 - a card management system for issuing and managing said cards; and
 - a card application unit, connected to said card management system, for reading data from the card in response to a usage request,
- said card comprising the individual identification information and group value information identifying a group to be searched,
- said card management system comprising card issuance and management means for issuing and managing said cards, hot list creation means for creating a hot list listing invalid cards, and communication means for communicating with said card application unit via the communication line,
- said card application unit comprising read means for reading the individual identification information and the group value from the card, by-group

Sub A27

list creation means for creating a by-group list from the hot list 21 distributed from the card management system via the communication line, said by-group list grouped by the group value, invalid card checking means for checking if said card that was read is invalid, card processing means for processing the card based on a result of said invalid card checking means, and communication means for communicating with said card management system via the communication line.

4. The card system according to claim 3, wherein said card issuance and management means checks, in a predetermined timing, if there is a bias in numbers of individual identification information pieces registered with the group values on the hot list and, if there is the bias, assigns to the new card the group value other than the group value of the group with which many individual identification pieces are already registered.

3/

5. The method according to claim 1, wherein said grouping is performed with each of a plurality of hash values calculated by a predetermined hash function as the group value and wherein said group value of each of said electronic storage media corresponds to the hash value calculated by said hash function using the individual identification information assigned to each of said electronic storage media.

4/

6. The method according to claim 5, wherein said electronic storage medium is an IC card.

3

7. The card system according to claim 3, wherein

04423-10595
55007-9322760

said grouping is performed with each of a plurality of hash values calculated by a predetermined hash function as the group value and wherein said group value of each of said cards corresponds to the hash value calculated by said hash function using the individual identification information assigned to each of said cards.

8. The card system according to claim 7, wherein said card is an IC card.

9. A method for issuing a new card in a card management system, the method comprising the steps of:
preparing a plurality of group values as card classification information;

examining an invalid card occurrence ratio of each group value for the cards already issued; and

issuing the new card to which the group value other than the group value with the highest invalid card occurrence ratio is assigned.

10. The method according to claim 9, wherein said invalid card occurrence ratio is checked regularly.

11. The method according to claim 9, wherein each of the cards issued by said card management system stores therein individual identification information and the group value information.

12. The method according to claim 11, further comprising the steps of:

getting the group value of each of said invalid cards either from the individual identification information or from the group value information, the

00442786-400000

Sub A37

individual identification information and the group value information being assigned to each of said invalid cards;

calculating an average of said invalid cards per group value in terms of a number of invalid cards; and

issuing the new card assigned to the group value having the number of invalid cards smaller than said average.

13. The method according to claim 9, wherein said plurality of group values correspond, on a one-to-one basis, to a plurality of hash values calculated by a predetermined hash function and wherein said group value of each card corresponds to the hash value calculated by said hash function using individual identification information assigned to each of said cards.

14. The method according to claim 9, wherein a new group value is created in said step of issuing said new card and the new card assigned to said new group value is issued.

15. A card comprising:
individual identification information assigned to the card; and

group value information assigned to said card, said group value information being one of a plurality of values prepared for classifying the cards, wherein said group value information specifies which group value part to be searched on a list listing invalid cards classified into said plurality of values.

041236 405599
655007 332760

SUBA47

SUA 4

16. A card management system wherein a plurality of group values are prepared as card classification information, said system comprising:

a hot list creation unit which creates a hot list containing at least individual identification information for each of invalid cards;

a storage unit for storing said hot list; and

a card issuance and management unit which reads said hot list from said storage unit, finds the group value assigned to each of said invalid cards, checks an invalid card occurrence ratio of each group value, and issues a new card to which the group value other than the group value with the highest invalid card occurrence ratio is assigned.

17. The card management system according to claim 16, wherein said grouping is performed with each of a plurality of hash values calculated by a predetermined hash function as the group value and wherein said group value of each of said cards corresponds to the hash value calculated by said hash function using the individual identification information assigned to each of said cards.

18. The card management system according to claim 16, wherein said card issuance and management unit calculates, from the individual identification information on each of said invalid cards, the group value assigned to the invalid card, said individual identification information being stored in said storage

004228:10599

unit.

19. A method for detecting invalid cards in a card system, the method comprising the steps of:

preparing a plurality of group values as card classification information;

creating a list listing individual identification information on the invalid cards, said list being used for the detection and grouped by said group values;

reading a pair of the individual identification information and the group value information assigned to the card to be examined;

checking if the individual identification information that was read matches any of the individual identification information on the invalid cards of the corresponding group value information listed on said detection list; and

based on a result of said checking, judging if said card to be examined is invalid.

20. The method according to claim 19, wherein said grouping is performed with each of a plurality of hash values calculated by a predetermined hash function as the group value and wherein said group value of each of said cards corresponds to the hash value calculated by said hash function using the individual identification information assigned to each of said cards.

21. A computer-readable recording medium which is for use in a card management system and which stores

004423-10589

Sub A5

Sub A6

examining an invalid card occurrence ratio of each group value for the cards already issued; and

22. A computer-readable recording medium which is for use in a card management system and which stores thereon a program, the program comprising the steps of:

creating a list listing individual identification information on the invalid cards, said list being used for the detection and grouped by said group values;

checking if the individual identification information that was read matches any of the individual identification information on the invalid cards of the corresponding group value information listed on said detection list; and

DO NOT WRITE IN THESE SPACES